Drainage Plan Submittal Checklist

Reviewer:_____ Date:_____

Project Name:_____ Location:_____

Total Land Area of Ownership: _____ Acres

Type: _____Residential _____Commercial _____Industrial _____Recreation _____Municipal _____Other

Applicant:_____ Contact:_____ Phone #:_____

Applicant email: _____

Surveyor:_____ Contact:_____ Phone#_____

Surveyor email:_____

Engineer:_____ Contact:_____ Phone #_____

Engineer email: _____

Please check the appropriate box: I = Included; NA = Non-Applicable; R= Required prior to development
(If "NA" is checked, an explanation must be entered)

Report Format and Content	Applicant			Engr	
Tab 1. General Information	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
1.1 CD of drainage plan, including preliminary Master Grading Plan, preliminary plat, and proposed plat, in PDF format and one half-size paper copy bound with this checklist included behind the cover to Storm Water Management by Thursday at 4 PM two weeks prior to the subdivision committee hearing on the final plat					
1.2 Professional Engineer seal, signature and date on cover of report					
1.3 Site location map, using color ortho photo with project boundaries					
1.4 North arrow and scale on site location map					
1.5 Discussion of development, existing conditions, and proposed impacts on storm water, wetlands, riparian zones, and floodplain					
1.6 Discussion of offsite conditions					
1.7 Summary table of runoff calculations (pre/post development); no increase in peak discharge for all storm series					
1.8 Narrative description of the type and function of the permanent structural storm water management facilities					

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Tab 2. Existing Conditions Hydrologic Analysis	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
2.1 Existing Conditions Drainage Map					
2.1.1 Drainage map shows existing onsite and offsite topography; one foot contours required with spot elevations (NAVD 88 datum); onsite and offsite drainage delineated by modifying the Wichita/Sedgwick County LIDAR/hydrogeodatabase					
2.1.2 Map shows existing streams, creeks, and waterways (perennial and intermittent), with names labeled and flow directions indicated by arrows					
2.1.3 Map shows location and boundaries of natural features such as wetlands, lakes and ponds with the normal water elevation noted, rock outcroppings, wooded areas and tree rows					

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2.1.4 Map shows location of existing conveyance systems such as storm drains, inlets, catch basins, open channels, swales, and areas of overland flow, with flow directions indicated by arrows					
2.1.5 Map shows existing structural elevations (e.g., pipes, manholes, etc.), and pipe materials and sizes					
2.1.6 Map shows location, dimensions and elevations of existing bridges or culvert crossings					
2.1.7 Map shows location of existing utilities (e.g., water, sewer, gas, electric, etc.) with labels and easements					
2.1.8 Map shows ground water elevations, if applicable					
2.1.9 Map shows delineation of predominant soils based on USDA soil surveys and/or onsite soil borings; indicate NRCS soil name and Hydrologic Soil Group (HSG) for undisturbed surface soils					
2.1.10 Map shows existing land-use and cover per NRCS nomenclature					
2.1.11 Map shows delineation of subareas (subbasins) for drainage calculations (subarea boundaries, subarea areas, impervious areas)					
2.1.12 Map notes existing site footprint area and existing total impervious area (acres)					
2.1.13 Map shows existing conditions time of concentration flow paths (segments, segment lengths, slopes, roughness parameters, and geometric properties if applicable) for each subarea					
2.2 Existing Conditions Hydrology and Hydraulics Analysis and Results					
2.2.1 Discuss hydrologic analysis methodology used (e.g., unit hydrograph or other approved methods)					
2.2.2 Provide table of existing subarea areas					
2.2.3 Provide table of pre-developed runoff curve numbers with supporting calculations					
2.2.4 Provide table of existing times of concentration with supporting calculations					
2.2.5 Provide reference to source rainfall data used in the analysis, and a summary table of rainfall data					
2.2.6 Provide cross-sections and other diagrams of existing open channels and other hydraulic features as required to illustrate basis for analysis					
2.2.7 Provide existing conditions hydrologic and hydraulic analysis for runoff rates, volumes and velocities, showing assumptions and other support information not already cited in this checklist, including detailed calculations (2, 5, 10, 25 & 100 year, 24-hour storm events); present results in table form; provide copies of any computer models used on CD					

Report Format and Content	**Applicant**			**Engr**	
Tab 3. Post-Development Hydrologic Analysis	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
3.1 Post-Development Drainage Map (portion of existing conditions drainage map covering project site area revised to show items indicated below)					
3.1.1 General Features on Map					
3.1.1.1 Map shows preliminary onsite post-development contours (NAVD 88 datum) and project boundary					

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3.1.1.2 Map shows any existing onsite features (e.g., structures and channels) noted in Tab 2 that are to remain after development					
3.1.1.3 Map shows location of proposed roads, buildings, parking lots and other impervious areas					
3.1.1.4 Map shows location of proposed utilities (e.g., water and sewer) and easements					
3.1.1.5 Map shows offsite through-drainage confined to an easement, dedication, and/or reserve					
3.1.1.6 Map shows delineation of predominant soil HSGs based on anticipated soil textures and NRCS guidelines if post-development soil characteristics will be different from existing soil characteristics					
3.1.1.7 Map shows post-development land-use and cover per NRCS nomenclature					
3.1.1.8 Map shows delineation of subareas (subbasins) for onsite drainage calculations (subarea boundaries, subarea areas, impervious areas and curve numbers)					
3.1.1.9 Map shows proposed limits of clearing and grading					
3.1.1.10 Map shows post-development time of concentration flow paths (segments, Tc, segment lengths, slopes, roughness parameters, and geometric properties if applicable) for each project site subarea					
3.1.2 Locations of Proposed Conveyances and BMPs					
3.1.2.1 Map shows location of proposed conveyance systems (including backyard drainage) such as storm drains, inlets, catch basins, open channels, swales, and areas of overland flow, with flow directions indicated by arrows					
3.1.2.2 Map shows proposed structural elevations (e.g., pipes, manholes, etc.), and pipe materials and sizes					
3.1.2.3 For any drainage area of 40 acres or more (either onsite or offsite through drainage), map shows the flow confined to an open channel with required side benches and freeboard, or if partially enclosed conforms to applicable policy and design criteria					
3.1.2.4 Map shows locations of storm water management facilities and 20' wide maintenance access easements					
3.1.2.5 Map shows proposed energy dissipator and channel protection locations					
3.1.2.6 Map shows location and dimensions of proposed channel, bridge or culvert crossing modifications					
3.1.2.7 Map shows 100-year pool elevation and normal pool elevation for ponds (see section 3.2)					
3.1.2.8 Map shows permanent concrete outfall control structure for ponds					
3.1.2.9 Map shows emergency overflow and top of berm elevation for ponds					
3.1.2.10 Map shows all floodplains, ponds and storm water management facilities in reserves					
3.2 Post-Development Conditions Hydrology and Hydraulics Analysis and Results					
3.2.1 Discuss hydrologic analysis methodology used (e.g., unit hydrograph or other approved methods)					
3.2.2 Provide table of existing onsite subarea areas					

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3.2.3 Provide table of post-development runoff curve numbers with supporting calculations					
3.2.4 Provide table of onsite post-development time of concentrations with supporting calculations					
3.2.5 Provide cross-sections and other diagrams of proposed open channels and other hydraulic features as required to illustrate basis for analysis					
3.2.6 Provide post-development conditions hydrologic and hydraulic analysis for runoff rates, volumes and velocities, showing assumptions and other support information not already cited in this checklist, including detailed calculations (2, 5, 10, 25 & 100 year, 24-hour storm events). For off-line projects, or on-line projects where project drainage area exceeds 10% of total on-line drainage area, calculations cover the site and extend downstream to a point where the proposed project site drainage area is equal to or less than 10% of the total drainage area at that point. In addition, for on-line projects analysis is extended downstream far enough to ensure no increase in peak flow rates. Present results in table form for all conveyances and structures; provide copies of any computer models used on CD					
3.2.7 For ponds, provide stage-storage-discharge or outlet rating curves and inflow-outflow hydrographs					
3.2.8 For ponds, demonstrate that the pond contours on the master grading plan and the stage-storage data are consistent					
3.2.9 For ponds, provide one foot of freeboard above the 100-year, 24-hour HWL					
3.2.11 Demonstrate that flows discharged from the project site are discharged in the same manner as before development, using level spreaders, other devices, or grading as required, or identify an appropriate flowage easement					
3.3 Storm Water Control Sizing					
3.3.1 Based on flows determined from the hydrology and hydraulics analysis, provide hydraulic sizing calculations for storm water controls					
3.3.2 Present, in table form, sizes, elevations, flows, velocities, and depths for each control, as applicable; verify that velocities are self-cleaning and non-erosive					
3.3.3 Provide typical details (including cross-sections where applicable) for outlet structures, embankments, spillways, grade control structures, conveyance channels, inlets, etc.					
3.4 Storm Water Management Facilities					
3.4.1 For each storm water management facility, in table form, describe facility, its TSS removal efficiency, total contributing drainage area, total contributing impervious area					
3.4.2 Provide 20' wide maintenance access for each facility					
3.4.3 Maintenance responsibility of facilities specified in the platters text. (i.e., Home Owners Association, Lot Owners Association, or lot owner)					
3.4.4 Water quality protection volume calculations					
3.4.5 Channel protection volume calculations					
3.4.6 Water quality TSS removal calculations					
3.4.7 TSS removal for site equals or exceeds 80%					

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3.4.8 Water quality and channel protection volume orifice size calculations					
3.4.9 Other calculations required for each facility as specified in the Storm Water Technical Guidance Manual					
3.4.10 Plans and typical details for each facility					

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Tab 4. Floodplain Submittal	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
4.1 Provide source of flood profile, floodplain, floodway, and discharges information					
4.2 Delineation of nearest base flood elevations					
4.3 Delineation of pre-developed regulatory floodplain/floodway limits using FEMA's current GIS database; limits to be per elevation and scaled location					
4.4 Delineation of post-developed regulatory floodplain and floodway limits; limits to be per elevation and scaled location, with project limits shown					
4.5 Provide floodway data table and discharges					
4.6 Provide all hydrologic and hydraulic study information for local floodplain studies, unnumbered Zone A elevation determinations and floodplain map revisions or required permits					
4.7 Provide regulatory floodway and four natural profile models (10, 50,100, and 500-yr) for existing and future watershed conditions					
4.8 Floodplains and floodways located within a reserve, where necessary					
4.9 Floodplain cut and fill calculations for storage sensitive basins					
4.10 Demonstrate that floodway elevations and velocities do not increase due to construction in a floodway ("No Rise Certification")					

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Tab 5. Federal, State and Local Permits (to be provided prior to construction unless otherwise specified)	**I/R**	**NA**	**Explanation / Location in Plan**	**I/R**	**NA**
5.1 US Army Corps of Engineers – regulatory program permits (Section 404 permit)					
5.2 Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Flood Plain Fill, Levee, Water Appropriations, Dam Safety permit, etc.)					
5.3 Federal Emergency Management Agency (FEMA) Letter of Map Changes (LOMA, LOMR, LOMR-f, CLOMR, etc.); shall be included and approved when project modifies the limits of the floodway					

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Tab 6. Half-Scale Preliminary Master Grading Plan	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
(One set of plans and a PDF shall be submitted to Storm Water Management. The final approved plan shall be sealed, signed and dated prior to Engineering receiving the final sanitary sewer plans.)					
6.1 Signed and sealed by Professional Engineer					
6.2 Title block, includes subdivision name and phase					
6.3 Cross hatch out future phases as information only					
6.4 Dated revision documentation above title block					
6.5 Scale not greater than 1 inch = 60 feet					
6.6 North arrow					

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6.7 Index or legend key					
6.8 Benchmarks (minimum of two) used for site control (NAVD 88 vertical datum)					
6.9 Existing contours of entire site, with contour interval of one foot					
6.10 Proposed contours for channels, ponds, and other permanent storm water management facilities (including ponds), with contour interval of one foot					
6.11 Spot elevations shown to nearest tenth of a foot for critical locations					
6.12 Proposed street and lot layout					
6.13 Underground storm drain locations					
6.14 Overflow locations for storms exceeding storm drain capacity					
6.15 Top elevations of storm drains at all inlets, manholes, and flow line elevations for all outfalls					
6.16 Locations of open ditches and lakes					
6.17 Flow direction arrows					
6.18 Proposed flow line elevations of all open ditches at maximum 100 feet intervals, and 100 year flood elevations thereon					
6.19 Ponds: pond bottom elevation					
6.20 Ponds: normal pool elevation					
6.21 Ponds: 100 year flood elevation					
6.22 Ponds: emergency overflow elevation					
6.23 Proposed top-of-curb elevations at points where drainage will be required to flow over the curb					
6.24 Platted minimum building opening elevation for each lot, in table form for all lots (excluding basement floor elevations)					
6.25 Standard foundation and elevation detail for slab on grade, full basement, view-out, partial view-out and/or walk-out construction					
6.26 Each lot: Top of foundation elevation					
6.27 Each lot: Notation for builders as to the type of structure that may be constructed and the view-out, walk-out or pad elevation as applicable					
6.28 All lots above 100-year flood elevation					
6.29 Grading around structures conforms to perimeter drainage requirements					
6.30 Backyard drainage conforms to backyard drainage requirements					
6.31 Adjacent subdivision lot lines, with lot labels and subdivision names					
6.32 All easements, right-of-ways and reserves shown					
6.33 Statement on proposed final plat: “A drainage plan has been developed for the subdivision and all drainage easements, right-of-ways, or reserves shall remain at the established grades and unobstructed to allow for the conveyance of storm water.” Note that the final Master Grading Plan must have a statement that certifies the plan complies with the approved Final Drainage Plan, or if not, an addendum to the Drainage Plan is included with the final Master Grading Plan.					

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